McTMA

Purpose:
Assist traffic management coordinators (TMCs) anticipate future demand across multiple ARTCCs and regulate traffic flow into the TRACON.

Users:
- En route TMCs
- En route radar controllers
- Terminal area TMCs

Field Sites:
New York, Cleveland, Boston, and Washington ARTCCs, Philadelphia TRACON and the ATCSCC

Operational Results:
- TMA-SC is operational at 8 ARTCCs as part of the FAA's Free Flight program.
- Several TMA-SC sites have shown a 3-5% increase in throughput as well as reduced internal departure delays.
- Phase I of McTMA field activities (completed in May 2003) successfully demonstrated the sharing of ETA information between facilities.

Future:
- Additional McTMA field trials testing a new scheduler will take place January - June 2004.
- McTMA is an integral component of the FAA's Free Flight Phase 2 Program.

Multi-Center Traffic Management Advisor

Overview
Traffic management coordinators (TMCs) and en route (Center) air traffic controllers manage and control arrival traffic into busy terminal areas (Terminal Radar Approach Controls, or TRACONs). The Single-Center Traffic Management Advisor (TMA-SC), a decision-support tool (DST) developed at NASA Ames Research Center and deployed as part of the FAA's Free Flight Phase 1 program, assists Center TMCs and air traffic controllers in flow management planning where a single Center is responsible for managing traffic to a terminal area.

Multi-Center TMA (McTMA) is a DST that will expand the TMA-SC planning horizon and facilitate traffic flow management and coordination between multiple ATC facilities. McTMA will help to address congestion issues where more than one Center affects traffic to a terminal area, common in the Northeast Corridor of the United States. Sectors in the Northeast are often narrow and congested, with complex, interacting traffic flows. Current flow restrictions that are implemented to manage this multi-Center traffic environment can be inefficient, resulting in no-notice holding and overly conservative miles-in-trail operations.

McTMA provides an effective communications infrastructure between facilities to share predictions of aircraft arrivals, provide improved flow visualization capabilities, and generate schedules for traffic through multiple Centers. With this set of shared information, TMCs will be able to better address congestion issues before they become no-notice holding situations. McTMA will also enable time-based metering to allocate delays to the most appropriate sectors, whether in a first- or second-tier Center.

The McTMA Schedule
For each arrival aircraft in the system, McTMA computes the undelayed estimated time of arrival (ETA) to sector and Center boundaries, meter fixes, the final approach fix, and the runway threshold. The aircraft are then sequenced to these points on a first-come, first-served basis according to their ETAs and user-entered sequence constraints. Scheduled times of arrival (STAs) at each of these points are then computed to meet local constraints, user-defined scheduling constraints, and constraints automatically generated to ensure successive controllers will be able to meet their respective schedules.

McTMA creates a schedule well in advance of when traffic flow management decisions need to be implemented, and conveys this information to TMCs through graphical displays. In doing so, McTMA helps TMCs to devise a traffic plan and translate the traffic plan into sequences and STAs at the metering locations, maximizing airport and TRACON capacity while maintaining established separation standards. McTMA-generated schedules are displayed on the Center controllers' radar displays, where controllers determine the best strategies for meeting the schedule. McTMA continually updates its schedule at a rate comparable to the radar update rate in response to changing events (such as amount of traffic or changes in the winds) and controller and/or TMC inputs.

Initial Research Efforts
Current McTMA research, which is supported by NASA's Airspace Systems Program, focuses on arrivals into Philadelphia TRACON (PHL) that traverse New York, Washington, Cleveland, and Boston Centers. McTMA displays are installed at the five facilities, enabling them to visualize the traffic demand and shared scheduling information.